Abstract Submitted
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Thin blend films of cellulose and polyacrylonitrile RUI LU, XIN ZHANG, Department of Materials Science and Engineering, University of Maryland, College Park, MD, YIMIN MAO, NCNR, NIST, Gaithersburg, MD, ROBERT BRIBER, HOWARD WANG, Department of Materials Science and Engineering, University of Maryland, College Park, MD — Cellulose is the most abundant renewable, biocompatible and biodegradable natural polymer. Cellulose exhibits excellent chemical and mechanical stability, which makes it useful for applications such as construction, filtration, bio-scaffolding and packaging. To further expand the potential applications of cellulose materials, their alloying with synthetic polymers has been investigated. In this study, thin films of cotton linter cellulose (CLC) and polyacrylonitrile (PAN) blends with various compositions spanning the entire range from neat CLC to neat PAN were spun cast on silicon wafers from common solutions in dimethyl sulfoxide / ionic liquid mixtures. The morphologies of thin films were characterized using optical microscopy, atomic force microscopy, scanning electron microscopy and X-ray reflectivity. Morphologies of as-cast films are highly sensitive to the film preparation conditions; they vary from featureless smooth films to self-organized ordered nano-patterns to hierarchical structures spanning over multiple length scales from nanometers to tens of microns. By selectively removing the PAN-rich phase, the structures of blend films were studied to gain insights in their very high stability in hot water, acid and salt solutions.

Rui Lu
Department of Materials Science and Engineering, University of Maryland, College Park, MD

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